Nov. 17, 1953 J. A. ZINN, JR 2,659,340

APPARATUS FOR APPLYING HOT MELT ADHESIVE TO CARTON BLANKS

Filed June 20, 1950

6 Sheets-Sheet 1

Fig. 1

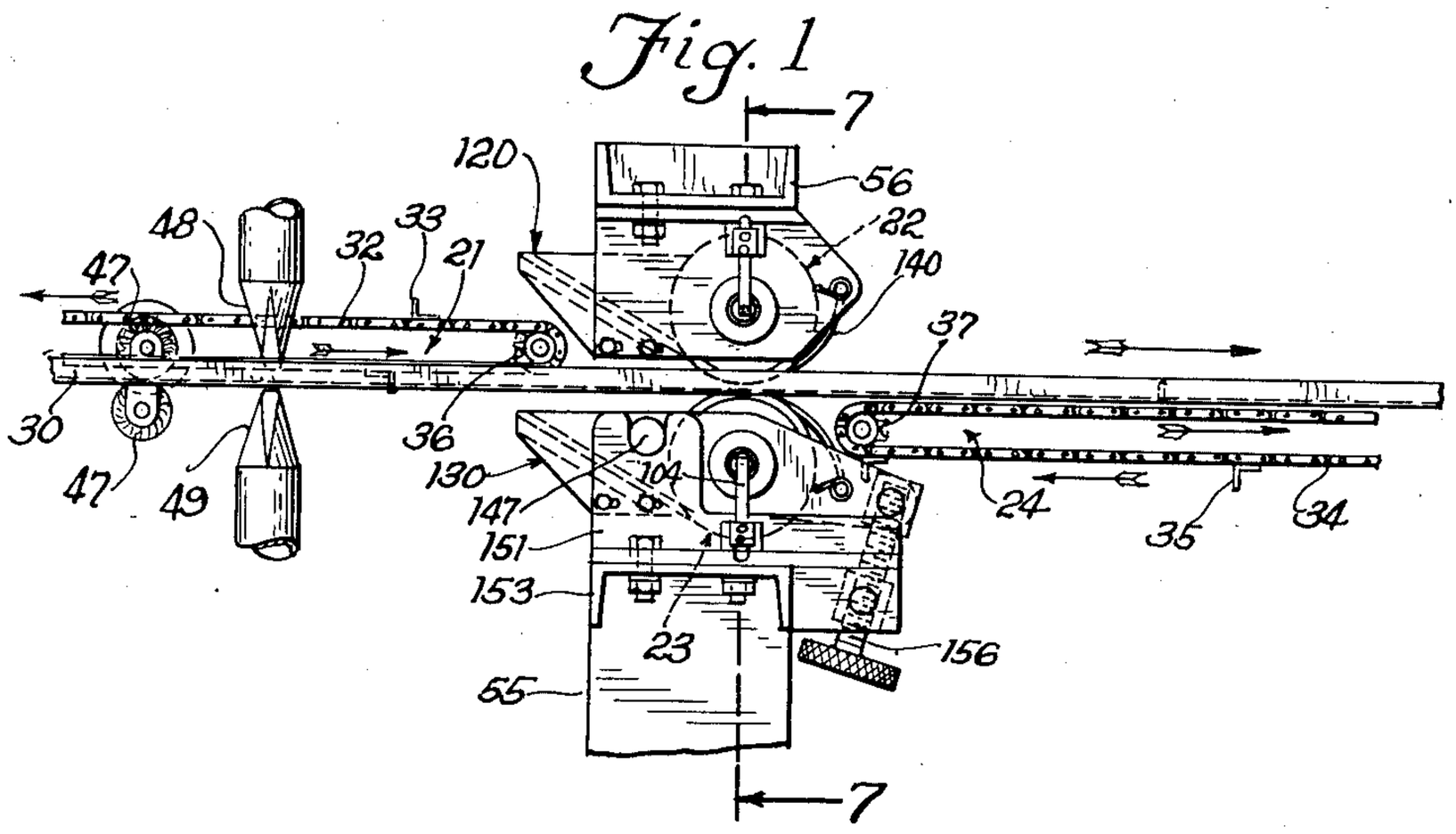
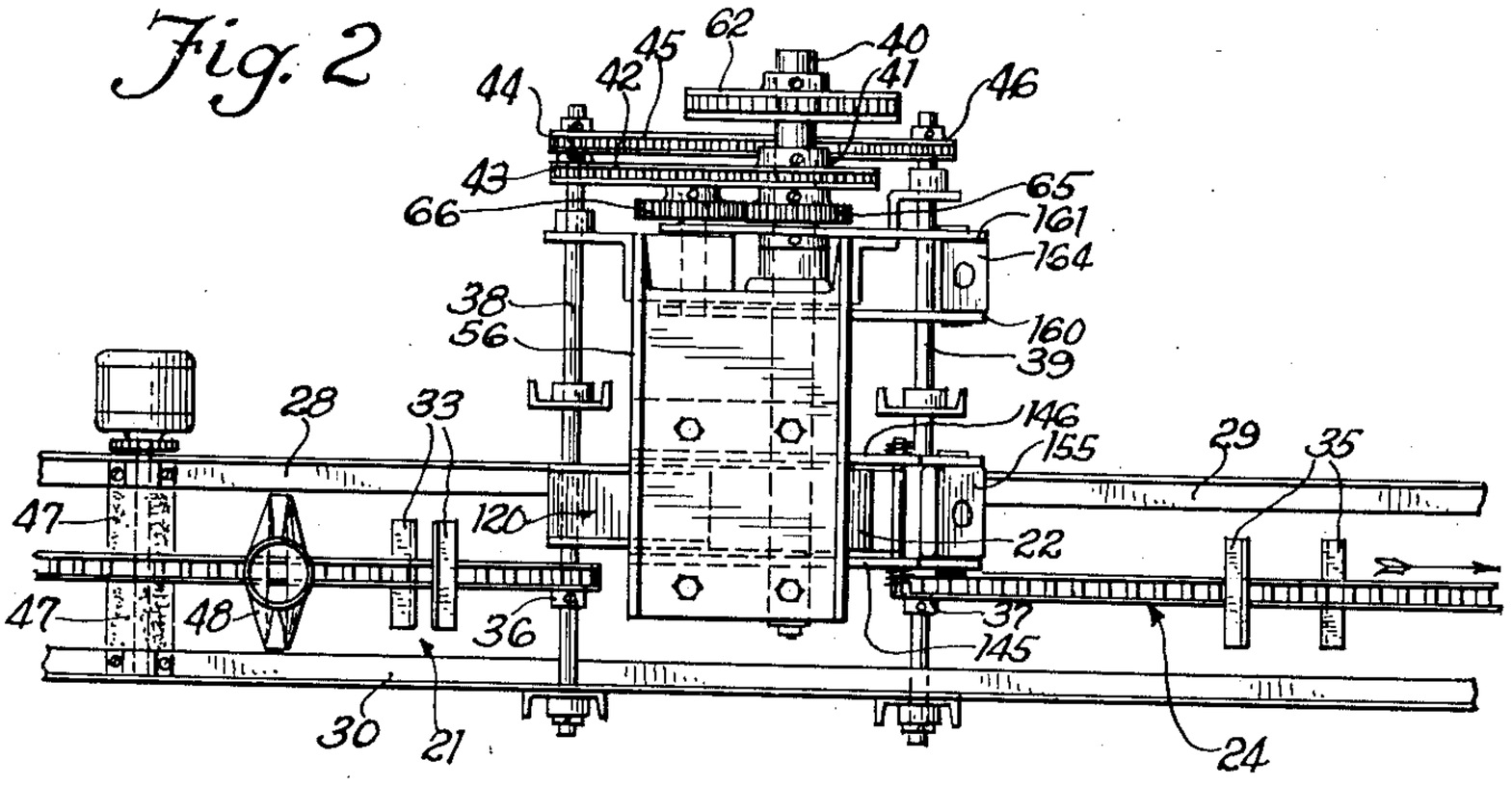


Fig. 2



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APPARATUS FOR APPLYING HOT MELT ADHESIVE TO CARTON BLANKS

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Fig. 3

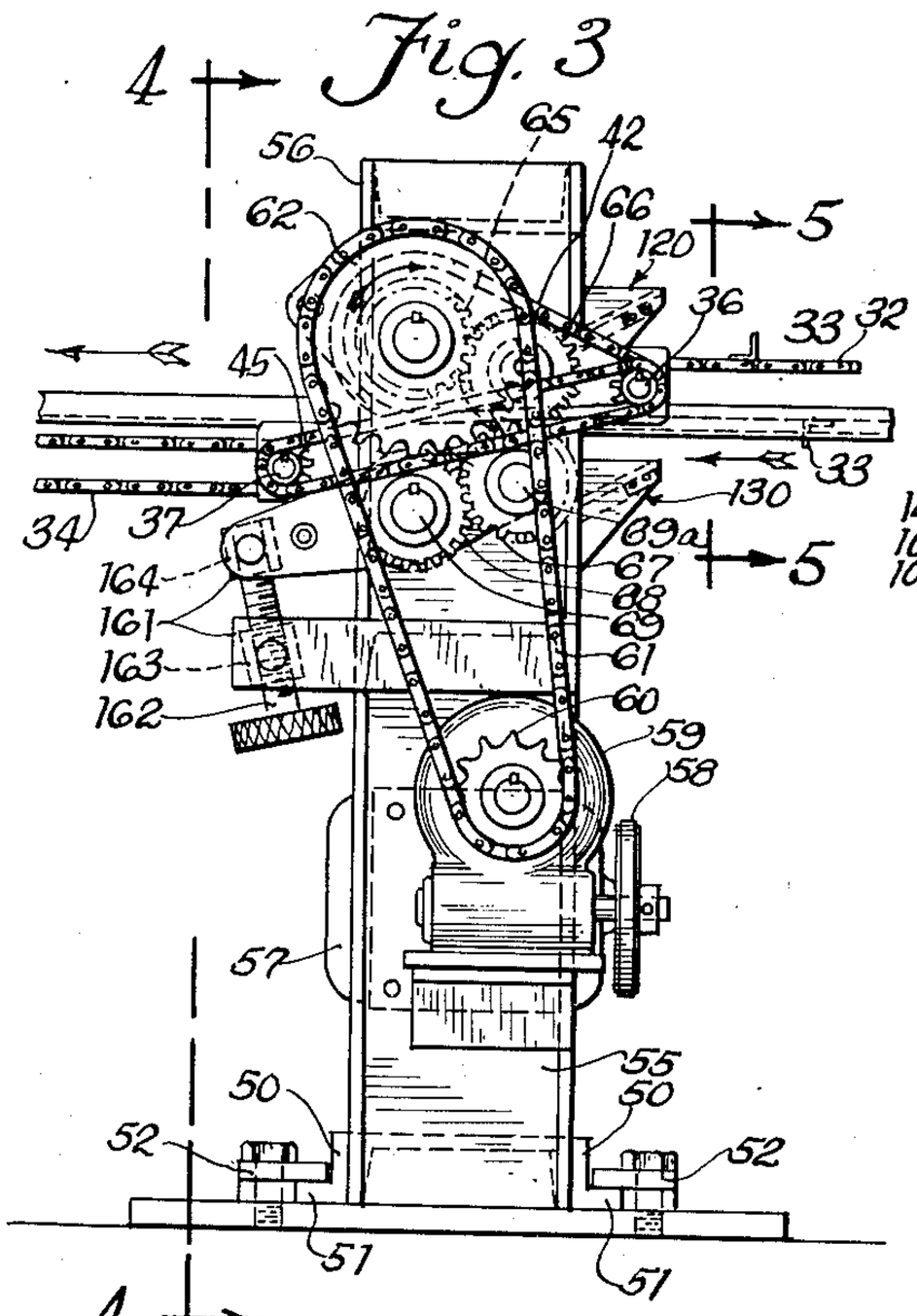
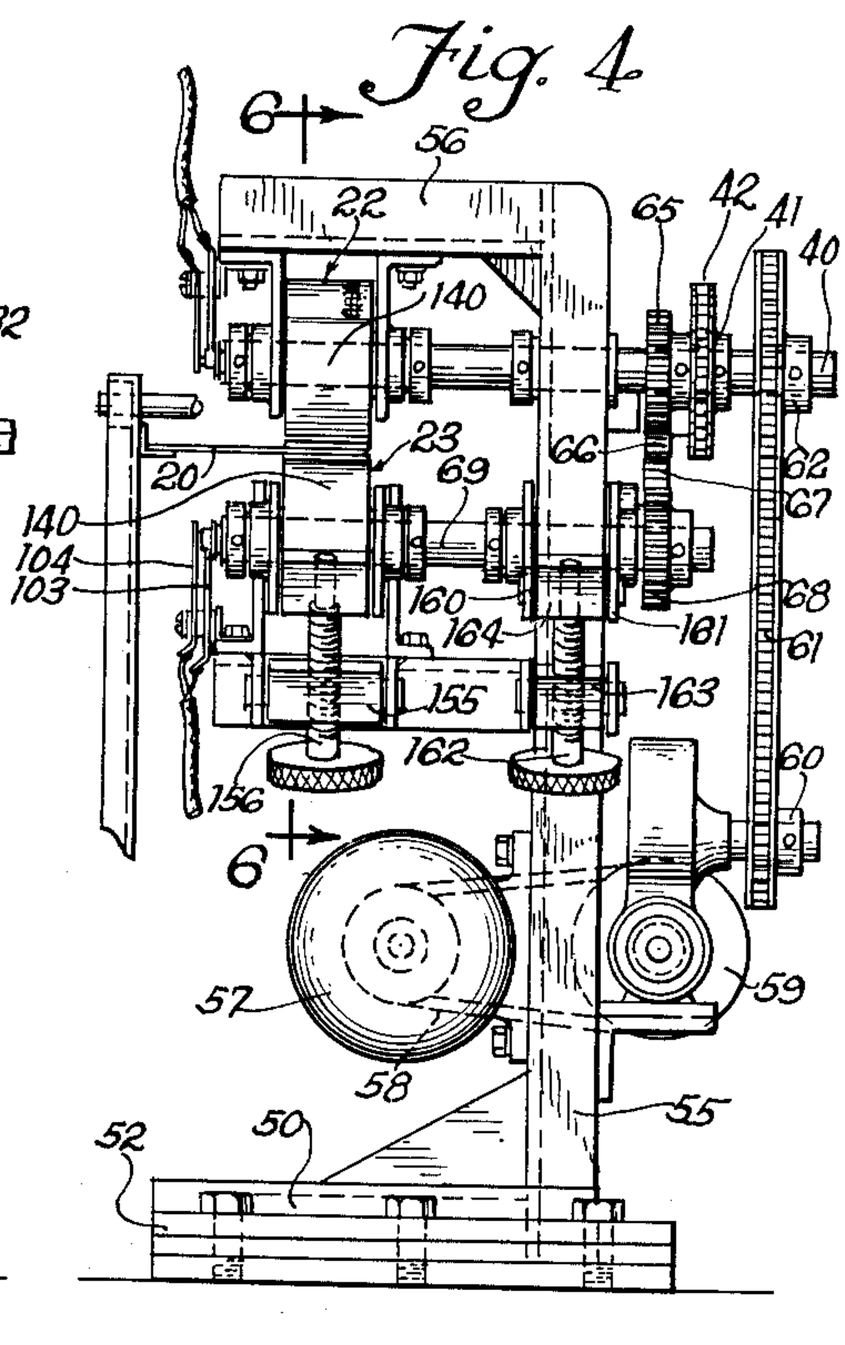


Fig. 4



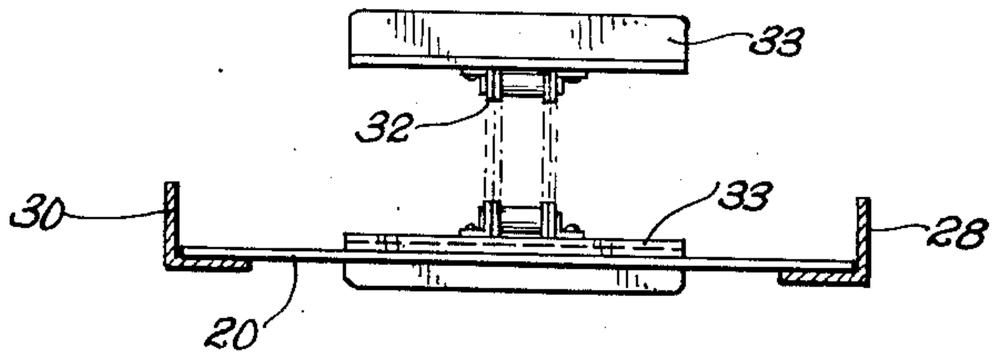


Fig. 5

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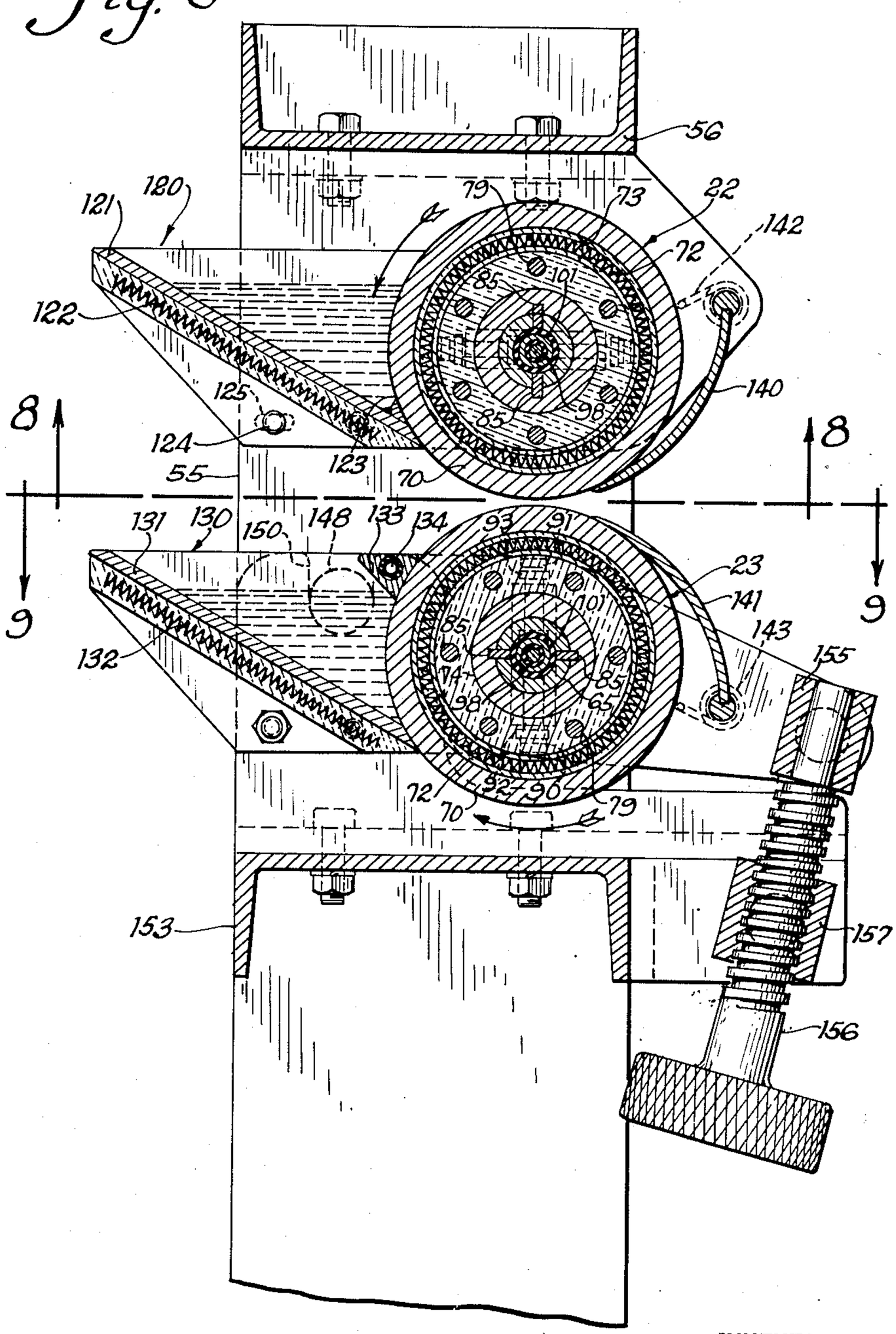
Fig. 6



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APPARATUS FOR APPLYING HOT MELT ADHESIVE TO CARTON BLANKS

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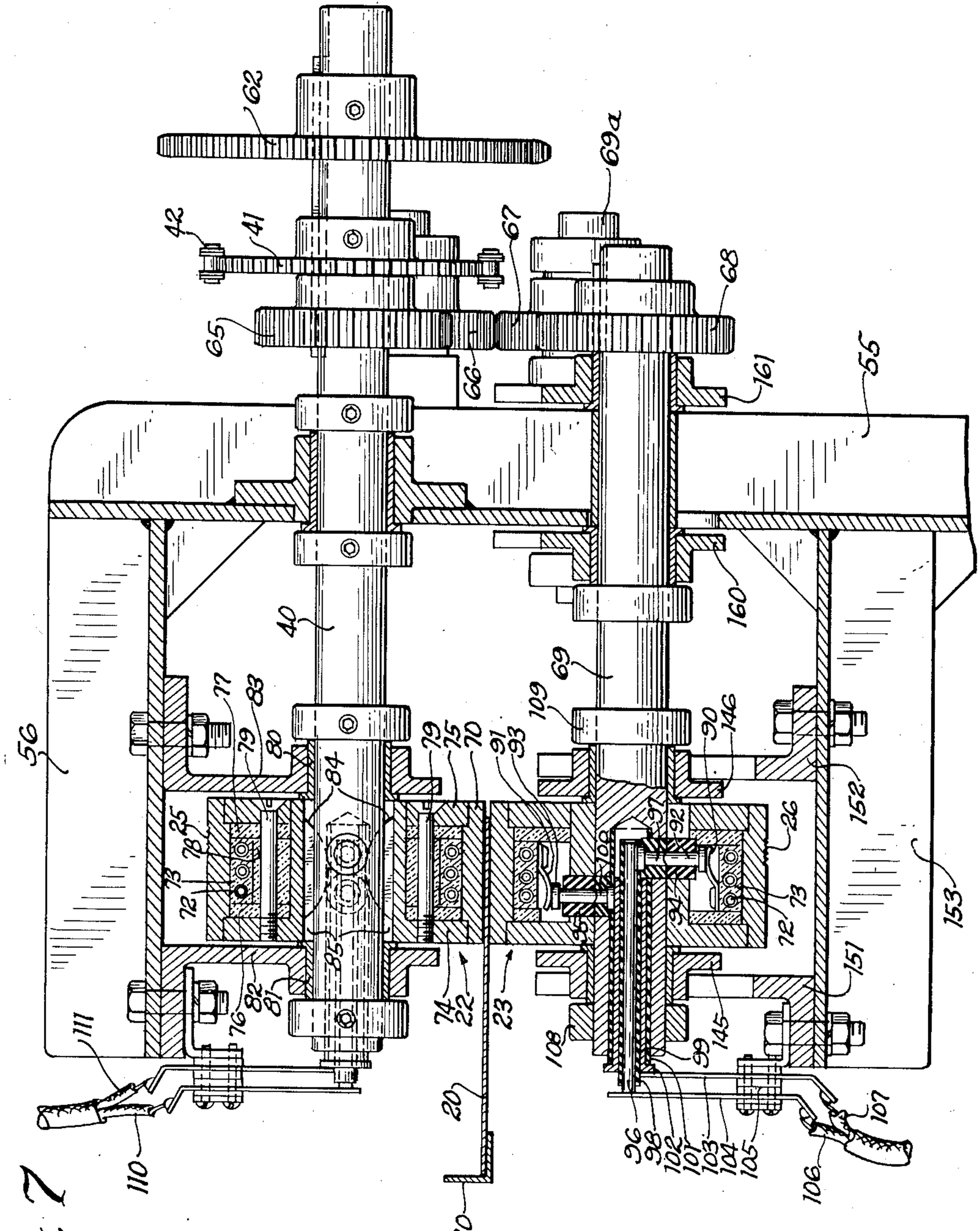

Fig. 7

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APPARATUS FOR APPLYING HOT MELT ADHESIVE TO CARTON BLANKS

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Fig. 8

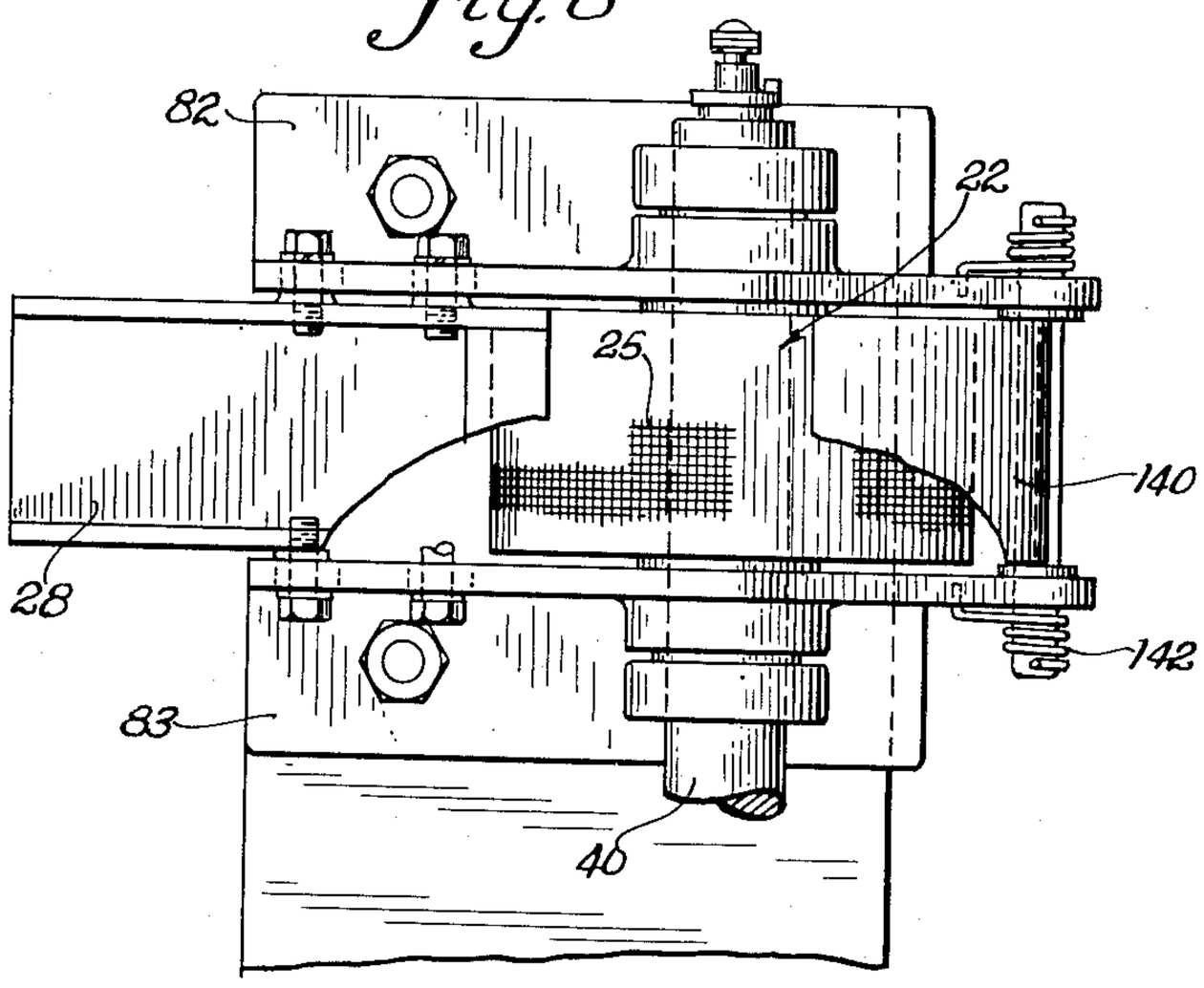
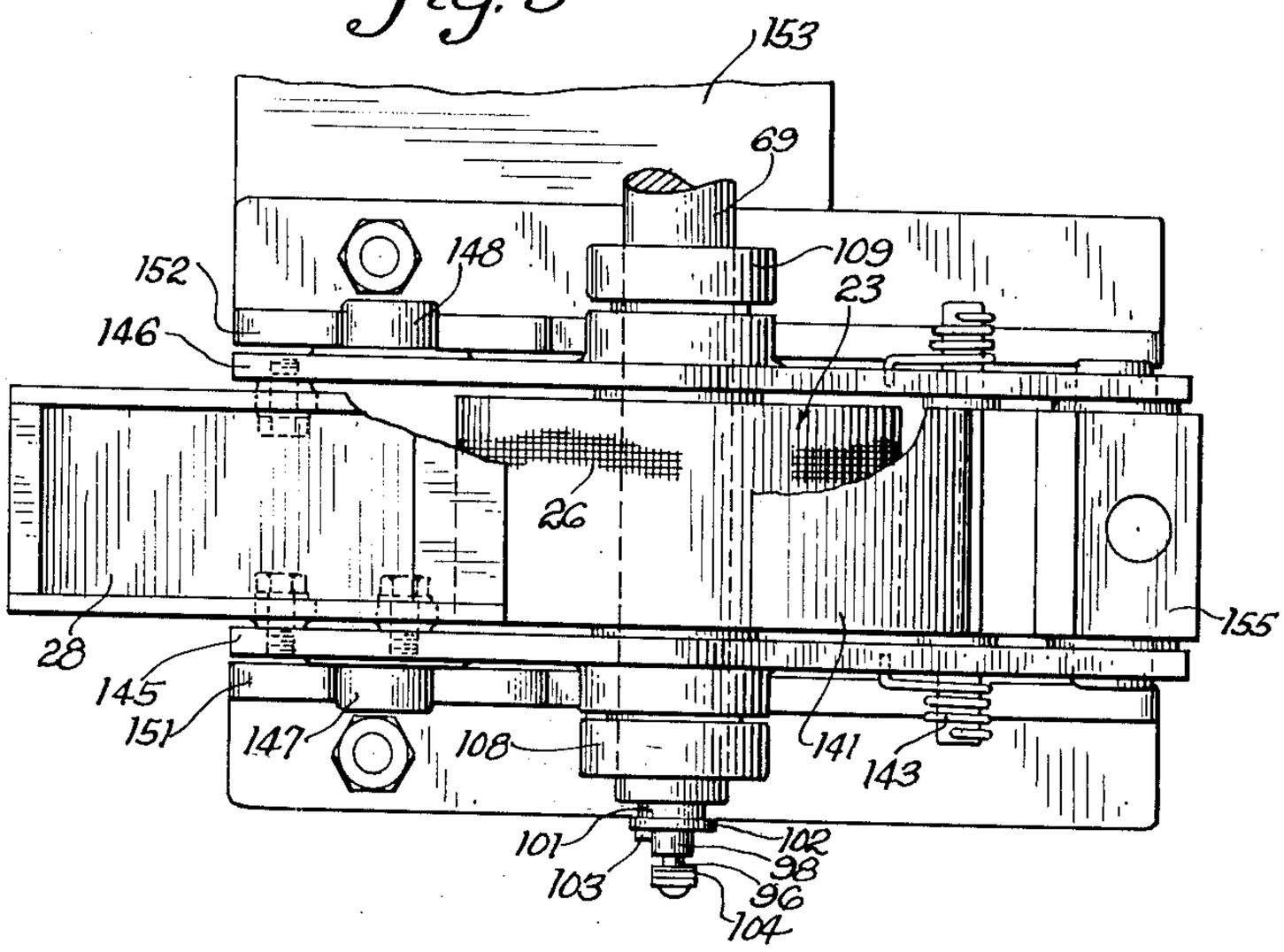


Fig. 9



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APPARATUS FOR APPLYING HOT MELT ADHESIVE TO CARTON BLANKS

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Fig. 10

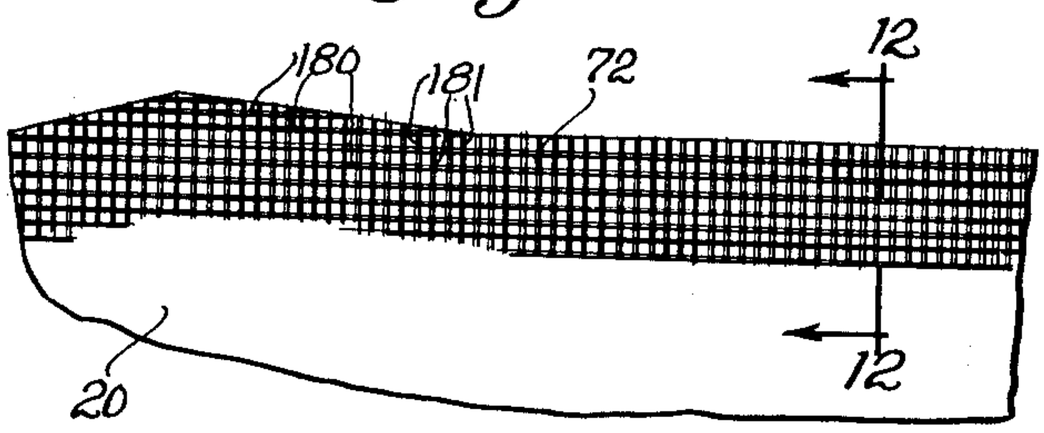


Fig. 11

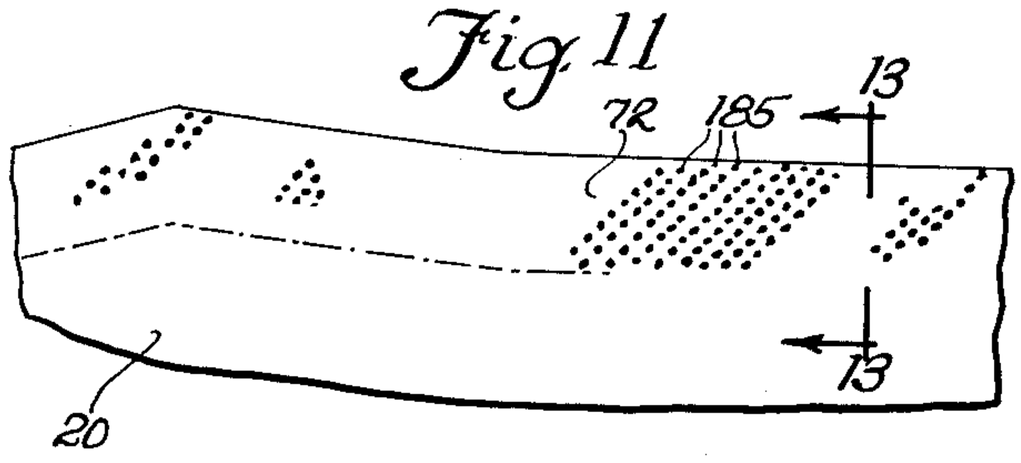


Fig. 12

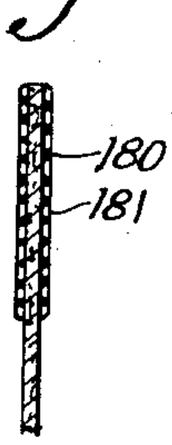


Fig. 13

Fig. 14

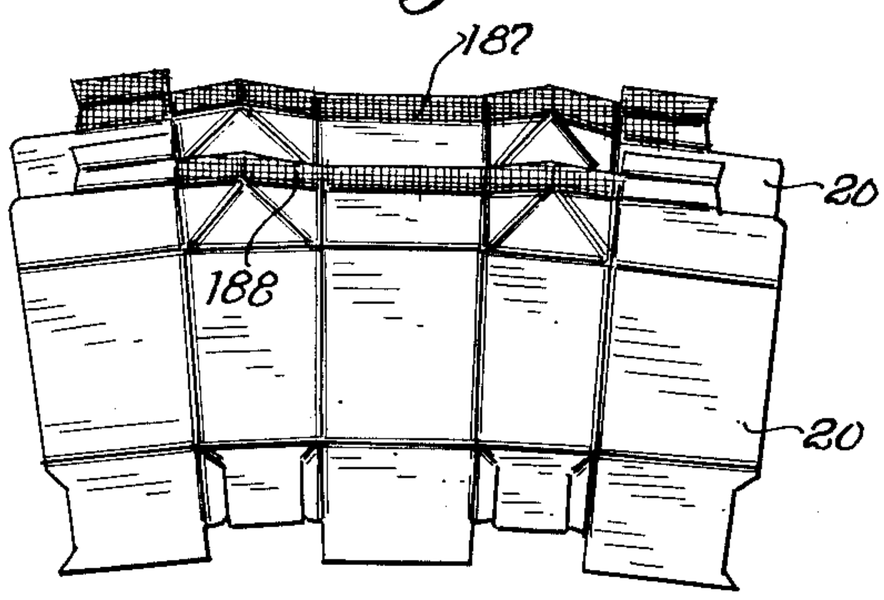
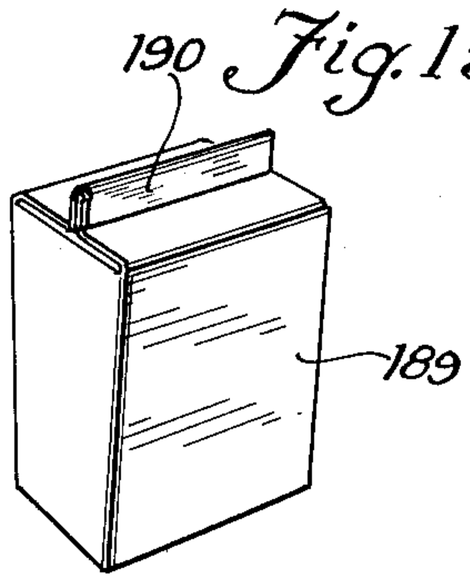


Fig. 15



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Patented Nov. 17, 1953

2,659,340

UNITED STATES PATENT OFFICE

2,659,340

APPARATUS FOR APPLYING HOT MELT ADHESIVE TO CARTON BLANKS

Julius A. Zinn, Jr., Chicago, Ill.

Application June 20, 1950, Serial No. 169,163

2 Claims. (Cl. 118—202)

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The present invention relates to methods and apparatus for applying hot melt adhesive to carton blanks, and, more particularly, to methods and apparatus for simultaneously applying such adhesives to both sides of a paperboard carton blank.

Although not specifically limited thereto, methods and apparatus embodying the present invention are particularly designed for use with and will hereinafter be illustrated and described in connection with carton blanks of the type disclosed in a prior Patent No. 2,412,666 issued December 17, 1946 to the present inventor. Furthermore, the methods and apparatus of the present invention are particularly suitable for use in the conveying and feeding apparatus of a carton forming machine of the type disclosed in a prior Patent No. 2,480,177 issued August 30, 1949 to Julius A. Zinn, Jr. and Michael J. Wilson.

Such cartons are formed from paperboard blanks upon both sides of which there has been deposited a pattern of the said adhesive of the appropriate configuration to enable the carton to be sealed after filling and closing the same, and which is particularly suitable for use in the apparatus for closing and sealing cartons of the type disclosed in an United States patent application, Serial No. 156,736, filed April 19, 1950, by Julius A. Zinn, Jr. and Curtis B. Shaw. In order that the said blank may be in a continuing operation immediately formed into a carton, after the application of such adhesive to the blank without waiting for the said adhesives to dry or cure, a thermoplastic adhesive, commonly called a "hot melt" adhesive, is preferably applied to the blank in the desired pattern. Furthermore, in the event that the said apparatus hereinafter to be disclosed for applying the hot melt be used to apply the said hot melt adhesive to blanks that are to be stored for future fabrication into cartons the said adhesive applied blanks may be immediately stacked one on top of the other in a continuing operation without experiencing the danger of one adhesive applied blank sticking to the other.

In depositing the adhesive on the blank, it is desirable to apply it simultaneously to both sides of the blank in order to provide a compact structure of simple construction as well as to minimize the overall size and cost of the equipment. While certain arrangements heretofore proposed have employed a pair of opposed rolls, one of which is heated, to apply a hot melt adhesive to one side of a blank, or web, at one time; when it is desired to apply a hot melt adhesive simultaneously to both sides of the blank, a problem arises in connection with the upper roll, due to the tendency of the liquid-like adhesive to flow out of the intaglio pattern of the upper roll under the influence of gravity and thus to deposit adhesive in undesired areas of the blank.

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Additionally, when heated rolls are used to apply the adhesive, as is necessary in the case of a hot melt adhesive, the rolls tend to carbonize any organic material which may collect thereon and the resultant carbon particles produce peripheral scoring of the surface of the rolls, and the consequent depositing of adhesive in undesired areas of the blanks.

Accordingly, it is an object of the present invention to provide methods of and apparatus for simultaneously applying a hot melt adhesive to both sides of a paperboard blank in a predetermined pattern.

It is another object of the present invention to provide new and improved methods and apparatus for simultaneously applying a pattern of hot melt adhesive to both sides of a paperboard blank without depositing adhesive in undesired areas of the blank.

It is a further object of the present invention to provide new and improved methods and apparatus for simultaneously applying a hot melt adhesive to both sides of a paperboard carton blank in which scoring of the surface of the adhesive applicator rolls and the resultant scoring and/or depositing of adhesive in undesired areas of the blank is minimized.

It is still another object of the present invention to provide new and improved methods and apparatus for simultaneously applying a hot melt adhesive to a paperboard blank wherein an upper applicator roll is rotated at a rate sufficient to prevent liquid adhesive from flowing onto undesired portions of the upper applicator roll.

Another object of the present invention resides in the provision of mechanism for rotating a pair of opposed applicator rolls in opposite directions while providing for adjustment of the separation between the rolls.

Briefly, in accordance with one aspect of the invention, the method of simultaneously applying a predetermined pattern of hot melt adhesive to both sides of a paperboard blank comprises the steps of simultaneously removing loose

organic material from both sides of the paperboard blank, depositing adhesive which is heated to a thin liquid state on a pair of heated opposed rolls having intaglio patterns of said predetermined configuration, removing the adhesive from the surface of the rolls, rotating the rolls at a rate sufficient to hold the adhesive within the intaglio pattern on the upper roll, simultaneously transferring the adhesive on said rolls to both sides of said blank by passing said blank between the rolls at a rate equal to the peripheral rate of the rolls and synchronized therewith and partially solidifying the adhesive so transferred as it strikes the blank to pull the adhesive out of the intaglio patterns of the rolls.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational view of a preferred form of apparatus for carrying out an adhesive applying method embodying the present invention;

Fig. 2 is a plan view of the apparatus shown in Fig. 1;

Fig. 3 is a side elevational view of the apparatus of Fig. 1 taken from the opposite side thereof and including the driving mechanism therefor;

Fig. 4 is an end elevational view taken along the line 4—4 of Fig. 3;

Fig. 5 is a detail sectional view taken along the line 5—5 of Fig. 3;

Fig. 6 is a sectional view on a larger scale taken along the line 6—6 of Fig. 4;

Fig. 7 is a sectional view on a larger scale taken along the line 7—7 of Fig. 1;

Fig. 8 is a bottom view taken along the line 8—8 of Fig. 6;

Fig. 9 is a top view taken along the line 9—9 of Fig. 6;

Figs. 10 and 11 are enlarged fragmentary views showing adhesive patterns deposited on a paperboard blank in accordance with the method and apparatus of the invention;

Fig. 12 is a detailed sectional view taken along the line 12—12 of Fig. 10;

Fig. 13 is a detailed sectional view taken along the line 13—13 of Fig. 11;

Fig. 14 is a plan view of two opposed overlapping carton blanks illustrating the adhesive pattern which is simultaneously applied in accordance with the invention; and

Fig. 15 is a perspective view of a completed carton.

Referring now more particularly to the drawings, there is shown in Figs. 1 to 9, inclusive, an apparatus embodying the present invention for simultaneously applying a hot melt adhesive to both sides of a series of spaced carton blanks of the type shown in the Zinn Patent No. 2,412,666 referred to heretofore and also shown in Figs. 10 to 15 inclusive of the drawings.

While the adhesive which is applied by means of the apparatus of Fig. 1 and in accordance with the methods of the present invention may comprise any suitable thermoplastic adhesive of the hot melt type which is a solid at normal temperatures and becomes a liquid at a predetermined elevated temperature, I prefer to employ a hot melt adhesive compounded in accordance with the following formula:

80 to 90%----------	Polyamide resin
3 to 6%----------	Phthalate plasticizer
6 to 10%----------	Esterified hydrogenated rosin
1 to 3%----------	Paraffin wax

This adhesive may be purchased from the Union Paste Company, of Hyde Park, Massachusetts.

A hot melt adhesive compounded in accordance with the above formula has been found particularly suitable for use in sealing paperboard cartons of the above-described type. Such an adhesive, when heated to an elevated temperature, becomes a thin fluid which is suitable for application to paperboard blanks in a predetermined pattern. However, if the temperature to which the adhesive is raised is considerably above the the melting point of the adhesive, the paraffin wax will evaporate in due course of time resulting in carbon particles being formed due to carbonization of the adhesive compound. These particles will tend to gather at the scraper edges and cause scoring of the peripheral surfaces of the rolls with the consequent scoring and/or depositing of adhesive in undesired areas of the paperboard blanks passing therethrough. Accordingly, the temperature of the hot melt adhesive is maintained at all times within a predetermined range which is great enough to melt the adhesive but which is not so great as to cause carbonizing thereof.

Considering now the apparatus shown in the drawings, this apparatus comprises an upper conveyor indicated generally at **21** which supplies carton blanks in the properly timed relation to a pair of opposed applicator rolls indicated generally at **22** and **23**. The carton blanks to which the hot melt adhesive has been applied in the desired pattern by means of the rolls **22** and **23** are conveyed away on a lower discharge conveyor indicated generally at **24**. The rolls **22** and **23**, as best shown in Figs. 8 and 9, are provided on their respective surfaces with engraved portions **25** and **26** by means of which the adhesive in a thin liquid state is applied to the blanks in the desired patterns.

The conveyor mechanisms **21** and **24**, as best shown in Figs. 1 and 2, comprise a pair of aligned inner rails **28** and **29** which extend up to the adhesive applying rolls **22** and **23**, and a common outer rail **30** which extends across in front of the rolls and is adjustable inwardly and outwardly to accommodate carton blanks of various widths. The conveyor mechanism **21** includes an endless chain **32** which is disposed above the rails **28** and **30** and is provided with outwardly extending fingers **33** which are adapted to engage the carton blanks and move them along the supporting rails. The discharge conveyor **24** is provided with a similar endless chain **34** which is disposed below the rails **29** and **30** and is provided with the carton engaging fingers **35**.

In order to move the fingers **33** and **35** in the proper timed relationship with respect to rotation of the applicator rolls **22** and **23**, the roller chains **32** and **34** are respectively provided with sprocket wheels **36** and **37** secured on the shafts **38** and **39** which are driven from a main drive shaft **40** through a main conveyor drive sprocket **41** positioned on the shaft **40**. Thus, the sprocket **41** is connected through a chain **42** to a sprocket **43** on the shaft **38** and the shaft **38** is further provided with a sprocket **44** which is connected

through the chain **45** to a sprocket **46** on the shaft **39**. As the main drive shaft **40** is rotated, the sprocket wheels **36** and **37** are driven in the properly timed relation to present carton blanks to the applicator rolls **22** and **23** in the proper relationship with respect to the engraved patterns on the surfaces thereof.

In order to clean the surfaces of the carton blank, so that loose organic material thereon will not collect upon the heated applicator rolls **22** and **23** and carbonize thereon and produce scoring of the carton blanks on the surface of the rolls there is provided at a point along the upper conveyor **21** a cleaning and suction apparatus whereby such loose inorganic material is removed. Thus, there is provided a pair of revolving brushes **47** which are positioned above and below the carton blanks moving along the rails **28** and **30**, the brushes **47** engaging both surfaces of the carton blank. The brushes **47** provide a sweeping action on both surfaces of the blank and raise the nap, or fur, which is produced on these blanks by the original paperboard cutting operation. Positioned along the conveyor **21** at a point after the brushes **47**, there is provided a pair of suction heads **48** and **49** which are again positioned above and below the carton blank as it is moved along the rails **28** and **30**. The suction heads **48** and **49** are supplied from a suitable vacuum apparatus (not shown) and the vacuum pressure of each head is substantially equal so that the blank will remain properly positioned on the rails **28** and **30**. The suction heads **48** and **49** operate to remove any loose material which has been raised by the brushes **47** and which has not been brushed off prior to passage of the blanks between the suction heads. With this arrangement, loose organic material does not reach the applicator rolls **22** and **23** and the production of carbon particles which would cause scoring of the carton blanks and the surface of the rolls is prevented. In this connection it will be understood that other types of cleaning apparatus, such as, for example, electrostatic precipitator apparatus or the like, may equally well be employed to remove loose carbonic material from the blanks.

In order to support the hot melt adhesive applicator rolls and driving mechanism therefor, there is provided, as is best shown in Figs. 3 and 4, a generally C-shaped supporting structure which comprises a base portion **50** which is supported for sidewise movement, so as to adjust the position of the rolls with respect to the rails **28**, **29**, and **30** by means of the flange portion **51** which rides within grooves formed in suitable side supports **52**. The base portion **50** supports a post **55** at the top of which there is supported a cross arm **56**. The upright post **55** supports a driving motor **57** which is connected through the belt **58** to a gear reduction mechanism **59**. The mechanism **59** is provided with a sprocket wheel **60** and a chain **61** connects the sprocket **60** to a main sprocket wheel **62** on the main drive shaft **40**.

In order to drive the applicator rolls **22** and **23** in properly timed relationship with respect to the conveyors **21** and **24**, which conveyors are driven from the drive shaft **40** in the manner described heretofore, the main drive shaft **40**, which supports the applicator roll **22** at one end thereof, is provided with a driving gear **65** which meshes with a pair of idler gears **66** and **67** supported on suitable shafts journalled in the supporting post **55**. The idler gear **67** meshes

with a driven gear **68** positioned on a lower drive shaft **69** journalled in the supporting post **55** and supporting at its other end the applicator roll **23**.

Referring now more particularly to Figs. 6 and 7 wherein the applicator rolls and the manner in which these rolls are supported in the above-described supporting structure are shown in more detail, the upper applicator roll **22** comprises an outer cylindrical shell **70** on the outer surface of which there is engraved or otherwise formed the desired pattern **25** in which the adhesive is to be deposited. Within the cylindrical member **70** there is positioned an electrical heating element **72** encased in an insulating material **73**. The outer cylindrical shell **70** is supported by means of a flanged hub **74** and a side wall member **75**. In order to confine the heat produced by the element **72** to the outer shell **70**, a pair of the side disks **76** and **77** and an inner supporting hub **78** formed of insulating material are provided. The above-described assembly is held together by means of the bolts **79** which pass through the side wall member **75** and the insulating members **76**, **77**, and **78** and thread into the flange of the hub **74**. The flanged hub **74** is supported on the main drive shaft **40** and is positioned between the sleeve bearings **80** and **81**. The bearings **80** and **81** are in turn supported by the side supports **82** and **83** which are secured to the under surface of the cross arm **56** and depend therefrom. The flanged hub **74** is keyed to the drive shaft **40** by means of the Woodruff keys **84** which are positioned within the grooves **85** in the hub **74**, so that the applicator roll **22** is directly driven from the main drive shaft **40**.

In order to supply electrical power to the heating element **72** while permitting the drive shaft to rotate, and to the end that the applicator rolls and the heating elements may be separately removable so that applicator rolls having different engraved patterns on the surface thereof may be readily substituted, the rolls are constructed internally in the manner shown in Fig. 7 in connection with the bottom applicator roll **23**. In this connection, it will be understood that the roll **23** is identical in construction to the above-described roll **22**, and, hence, any discussion of one of the applicator rolls applies equally well to the other.

In order to connect the heating element **72** to an external source of power, the terminals thereof are connected to a pair of spring contact members **90** and **91**. The free ends of the conductive members **90** and **91** press again the heads of conductive studs **92** and **93** which are supported in blocks of insulating material **94** and **95** positioned on opposite sides of the flanged hub **74**. The conductive stud **92** is arranged to make contact with a central conductive rod **96** through a contact member **97** which engages one end of the rod **96**. The rod **96** is encased in an insulating shell **98** which is in turn surrounded by a conductive sleeve **99** which is connected through a contact member **100** engaging the inner end thereof to the conductive stud **93**. The sleeve **99** is insulated from the drive shaft by means of an outer insulating shell **101**. The conductive sleeve **99** is provided with a flanged end portion **102** against which the end of a wiper arm **103** may make contact as the drive shaft is rotated. Likewise, the end of another wiper arm **104** makes electrical contact with the exposed end of the central conductive rod **96** as the drive shaft ro-

tates. The wiper arms 103 and 104 are supported in an insulated block 105 and are connected through the conductors 106 and 107 to a suitable source of current. The contact members 97 and 100 are provided with conical seats which are adapted to receive the end portions of the conductive studs 92 and 93 when the applicator roll assembly is slid onto the drive shaft to the correct position so as to permit engagement therewith. In this connection it will be understood that the applicator roll assembly is keyed to the drive shaft so as to permit insertion thereon in one position only so that the applicator roll assembly may be slid onto the drive shaft until the conductive studs make contact with the respective contact members carried by the drive shaft at which time the assembly may be secured on the shaft by means of the collars 108 and 109. It will further be understood that electrical connection from the conductors 110 and 111, which may be supplied by the same source of power as the conductors 106 and 107, is made to the heating element of the upper applicator roll in a manner entirely similar to that discussed in connection with the lower applicator roll 23.

The brackets 82 and 83, which support the end of the drive shaft 40, also provide a support for a triangular shaped adhesive container 120, one side of which is closed by the surface of the roll 22. In order to maintain the hot melt adhesive in a thin liquid state, the sloping bottom wall 121 of the adhesive container 120 is adapted to be heated by a suitable electrical heating unit 122 which is encased in insulating material and is placed in contiguity with the bottom surface of the wall 121. At its lower edge the wall 121 of the container is provided with a scraper 123, one edge of which is constantly in engagement with the surface of the roll 22 so as to remove adhesive from all portions of the roller surface except the pattern. In order to adjust the adhesive container 120 to provide a scraping fit with the roll 22, suitable supporting pins 124 are positioned within slots 125 in the side wall so as to permit horizontal movement of the container. The bottom applicator roll 23 is also provided with an adhesive container 130 having a sloping bottom wall 131 which is heated by means of the electrical heating unit 132 in a manner similar to the container 120. The adhesive container 130 is further provided with a scraper 133, one edge of which is constantly in engagement with the surface of the roll 23 so as to remove the adhesive from all portions of the roll surface except the engraved pattern therein. In order that the adhesive may be maintained in a thin liquid state, the scraper 133 is provided with a tubular electrical heating unit 134 so as to maintain the scraping edge at the proper temperature. For the purpose of removing excess adhesive from the rolls after contact with the carton blank, and stripping the blank from the rolls in the event that the blank adheres to either roll, there is provided a pair of stripper and scraper blades 140 and 141 which contact the surface of the rolls 22 and 23 immediately following the point of contact with the carton blank and which are biased against the surface of the rolls by means of the coil springs 142 and 143.

In order to provide for adjustment of the bottom roll 23 toward and away from the upper roll so as to insure proper engagement with the carton blanks and to permit the use of blanks of varying thicknesses, the drive shaft 69, on which the roll 23 is mounted, is journalled in a carriage

comprising the side walls 145 and 146. The side walls 145 and 146 are provided at one end thereof with outwardly extending studs 147 and 148 (Fig. 9) which are adapted to be supported in suitable notches 150 (Fig. 6) in a pair of side brackets 151 and 152. The side brackets 151 and 152 are supported on a cross member 153 (Fig. 7) which is in turn supported from the upstanding post 55. At their opposite ends the side members 145 and 146 of the roll supporting carriage are connected to a pivoted block 155, which is adapted to receive the upper end of a pivotally mounted adjusting screw 156, the lower end of the screw 156 being threaded through a pivoted block 157 which is in turn supported from the cross member 153. With this arrangement, adjustment of the screw 156 is effective to raise and lower the roll 123 with respect to the roll 22.

In order to drive the adhesive applying rolls in predetermined relation with respect to the conveyor mechanisms 21 and 24 while simultaneously adjusting the separation between the rolls, as above described, and the movement of the conveyor mechanisms, the driven end of the drive shaft 69 is mounted in a second carriage comprising a pair of arms 160 and 161 (Fig. 7) which are adapted to pivot about a point in alignment with the pivot pins 147 and 148 on the roll supporting carriage and also in alignment with the axis of the idler gear 67. To this end the arms 160 and 161 are pivoted on the shaft 69*a* which supports the idler gear 67, the shaft 69*a* being in alignment with the pivot pins 147 and 148 of the roll support carriage. In order to permit the carriage 160 and 161 to be adjusted to coincide with the position of the lower applicator roll, there is provided, as clearly shown in Fig. 4, a second adjustment screw 162 which threads through a first pivoted block 163 and supports on the upper end thereof a second block 164 which is pivotally supported between the side arms 160 and 161 at the other end thereof. With the above-described arrangement in which the roll supporting carriage is pivoted about a point which is in alignment with the axis of the idler gear 67, when the lower roll 23 is adjusted either toward or away from the upper roll, the shaft 69 and the gear 68 thereon move around the idler gear 67 so as to maintain these gears in mesh although the separation between the rolls may be varied considerably. In this connection, it will be understood that the wiper contact arms 103 and 104 associated with the lower applicator roll may be positioned so as to permit substantial up and down movement of the roll 23 while maintaining contact with the ends of the conductive members 96 and 99.

Considering now the operation of the above-described hot melt adhesive applying apparatus, it will be understood that a suitable hot melt adhesive, preferably an adhesive compounded in accordance with the foregoing formula, is placed within the adhesive containers 120 and 130 and is melted by means of the heating units 122 and 132 to a suitable thin liquid state. As the applicator rolls 22 and 23 move through their respective adhesive containers, the adhesive is deposited on the surface thereof and the scraper members 123 and 133 operate to remove the adhesive from all portions of the roll surface except the engraved patterns 25 and 26. The carton blank 20, both sides of which have been cleaned by means of the cleaning apparatus discussed in connection with Fig. 1, passes between the applicator rolls 22 and 23 so as to deposit on both sides thereof

the adhesive which is positioned within the engraved pattern of either roller. In this connection, it will be understood that the separation between the rolls **22** and **23** may be adjusted by means of the adjusting screws **156** and **162** so as to provide the necessary pressure to facilitate transfer of the adhesive in the engraved indentations in the surface of the roller to the surface of the carton blank.

The carton blanks are preferably at room temperature or below, whereas the hot melt adhesive is at a suitably elevated temperature such that it is in a thin liquid state. It will be understood, in this connection, that the adhesive containers, the applicator rolls, and the scraper members are all heated to the correct temperature and are thermostatically controlled so as to maintain the adhesive in a thin liquid state. When the blank, which is relatively cool, passes between the heated rolls, the adhesive which strikes the surface of the blank on either side thereof, is partially congealed so as to pull the remaining adhesive out of the pockets, or engraved indentations, in the surface of the rolls. With this arrangement, a substantial amount of liquid adhesive is deposited in the desired areas of the blank although the indentations are relatively shallow and provide only a thin film of adhesive to work with. It will be understood that if the carton blank were heated to an elevated temperature, the adhesive would not congeal upon striking the surface thereof and hence little, if any, adhesive would be deposited in the desired areas on the blank.

In considering the action of the upper applicator roll **22** when a liquid-like adhesive is deposited within the engraved indentations thereon, it will be seen that the adhesive due to the force of gravity, tends to flow out of the indentations during travel from the bottom edge of the adhesive container **120** to the point of contact with the carton blank. However, I have found that the adhesive may be maintained in the desired pattern within these indentations by rotating the upper applicator roll at a speed which is sufficient to prevent the liquid adhesive from flowing out of the indentations and producing a blurred and non-distinct pattern on the carton blank. In this connection, it will be understood that the applicator rolls **22** and **23** are both driven at the same speed, hence, the applicator roll **23** is also driven at the correct speed to keep the adhesive within the indentations on the upper roll. The distance from the bottom edge of the adhesive container **120** to the point of contact with the container blank is so related with the speed of rotation of the upper roll that the adhesive is held within the indentations thereof and a clear, distinct pattern of adhesive is deposited on the blank.

While the pattern may be of any desired configuration, it is preferred to provide the indentations thereof with the configuration, shown in Figs. 10 and 11, wherein the adhesive coating, deposited on the blank **20** by means of the methods and apparatus heretofore described is shown in detail. As shown, the adhesive pattern in Fig. 10 comprises a plurality of horizontal lines of adhesive **180** which are crisscrossed with vertical lines **181** of substantially the same width. In the alternative, the pattern shown in Fig. 11 may be employed wherein the pattern consists of a plurality of cup-shaped indentations **185** which are aranged in spiral lines within the areas which are to be covered. In either of the patterns shown in Figs. 10 and 11, the indentations are

preferably such that the adhesive is maintained within individual, or discrete cup-like indentations, which are substantially separated from the surrounding surface of the roll so that the adhesive is maintained within the indentations during the travel from the bottom of the upper adhesive container to the point of contact with the carton blank.

In Fig. 14 there is shown the adhesive pattern which is applied to both sides of the carton blank **20**. As shown, one side of the carton **20** is coated in the pattern indicated at **187** and the other side of the carton is coated as shown at **188**. The carton blank, on which has been deposited the hot melt adhesive in the patterns shown at **187** and **188**, is formed into a rectangular shaped body portion **189** (Fig. 15) in which the bottom walls are folded and sealed to provide a liquid-tight seal. The open-mouthed container thus formed is then filled, closed and sealed by suitable apparatus so as to provide a bellows type end closure having an upstanding transverse closure rib. Preferably, the bellows type end closure may be formed and sealed by means of the apparatus shown in a co-pending application to Julius A. Zinn, Jr. and Curtis B. Shaw, Serial No. 156,736, which was filed on April 19, 1950.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein which are within the true spirit and scope of the invention as defined in the appended claims.

What is claimed as new and is desired to be secured by Letters Patent of the United States is:

1. Apparatus for simultaneously applying a predetermined pattern of hot melt adhesive to both sides of a paperboard carton blank, comprising a pair of heated intaglio rolls, means for depositing a thin film of adhesive which is heated to a thin liquid state on said rolls, means for removing substantially all of the adhesive from the surface of said rolls, means for rotating said rolls in opposite directions at a rate sufficient to hold the adhesive within the intaglio pattern of the upper roll, conveyor means for passing a carton blank between said rolls in predetermined relation to the intaglio patterns thereof to transfer simultaneously the adhesive thereon to predetermined areas on both sides of said blank, said blank being cooler than said rolls to congeal the adhesive so transferred as it strikes the blank and to pull the adhesive away from the intaglio patterns of the rolls, and means for simultaneously adjusting the separation between said rolls and the movement of said conveyor means while maintaining said predetermined relation between said rolls and said carton blank.

2. Apparatus for simultaneously applying a predetermined pattern of hot melt adhesive to both sides of a paperboard blank, comprising a pair of heated intaglio rolls positioned one above the other, means for depositing a thin film of adhesive which is heated to a thin liquid state on said rolls, means for removing substantially all of the adhesive from the unengraved surface of said rolls, means for rotating said rolls in opposite directions at a rate sufficient to hold the adhesive within the intaglio pattern of the upper roll after the surface thereof has been cleaned by said adhesive removing means and until said upper roll engages the upper surface of the blank, conveyor means for passing a carton blank horizontally between said rolls in predetermined relation to the intaglio pattern thereof,

thereby simultaneously to transfer the adhesive within the intaglio pattern of the rolls to predetermined areas on both sides of the blank, said blank being cooler than said rolls to congeal the adhesive so transferred as it strikes the blank and to pull the adhesive away from the intaglio patterns of the rolls, and means for simultaneously adjusting the separation between said rolls and the movement of said conveyor means while maintaining said predetermined relation between said rolls and said carton blank.

JULIUS A. ZINN, JR.

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